

TWO SPECIES OF *HORNELLIA* (SUBGENUS *METACERADOCUS*) FROM THE FLORIDA KEYS AND BELIZE (AMPHIPODA, MELPHIDIPPOIDEA)

J. D. Thomas and J. L. Barnard

ABSTRACT

Hornellia (*Metaceradocus*) *atlanticus*, a new species from Belize, related to *M. occidentalis*, an eastern Pacific species, is reported from the Caribbean Sea and a morphologically remote new species, *M. tequestae*, is described from the Florida Keys.

Two new species of *Hornellia* (*Metaceradocus*) from Belize and the Florida Keys are described. These are the first records of the genus and subgenus from the western Atlantic Ocean. One species, *M. atlanticus*, is very close to the Californian *M. occidentalis* but the other new species, *M. tequestae*, is much more remote as seen in couplet eight of the key.

Types and materials are deposited in the Crustacea Division, Smithsonian Institution (denoted as USNM). To justify description of new species, we present a key to both subgenera *Metaceradocus* and *Hornellia* and list the species of those subgenera.

KEY TO THE SPECIES OF THE SUBGENERA *METACERADOCUS* AND *HORNELLIA*

- 1a. Uropod 3 with article 2 on outer ramus (*Hornellia*) 2
- 1b. Uropod 3 lacking article 2 on outer ramus (*Metaceradocus*) 3
- 2a. Head with anteroventral cusp, epimeron 3 with small tooth, telson with medial spines
..... *H. whakatane*
- 2b. Head lacking cusp, epimeron 3 with large tooth, medial spines on telson absent *H. incerta*
- 3a. Epimeron 3 serrate posteriorly above corner 4
- 3b. Epimeron 3 not serrate posteriorly above corner 7
- 4a. Epimeron 2 with more than 2 serrations *M. perdentatus*
- 4b. Epimeron 2 with 0-2 serrations 5
- 5a. Epimeron 2 with 2 serrations, coxa 1 with anteroventral tooth, article 2 of antenna 1 much
longer than article 1 *M. microamphopus*
- 5b. Epimeron 2 smooth, coxa 1 lacking anteroventral tooth, article 2 of antenna 1 of no longer
than article 1 6
- 6a. Dorsal serrations of pleonite 3 even and regular *M. bidentatus*
- 6b. Dorsal serrations of pleonite 3 uneven and of mixed sizes *M. vesentiniiae*
- 7a. Epimeron 3 smooth *M. inermis*
- 7b. Epimeron 3 with posteroventral tooth 8
- 8a. Coxae 1-2 with anteroventral tooth, coxae 5-7 serrate, pleonite 6 lacking spines, uropod 1
lacking basofacial spines, telson $\frac{2}{3}$ cleft, apices symmetrical, no basal spines *M. tequestae*
- 8b. Coxae 1-2 lacking anteroventral tooth, coxae 5-7 not serrate, spines present on pleonite 6,
uropod 1 with basofacial spines, telson fully cleft, apices asymmetrical, with basal spines 9
- 9a. Epimera 2-3 with small tooth *M. occidentalis*
- 9b. Epimera 2-3 with large tooth *M. atlanticus*

List of Species in the subgenera *Hornellia* and *Metaceradocus*: *M. atlanticus* new species, herein, Belize; *M. bidentatus* Ledoyer, 1982, Madagascar; *M. inermis* Ledoyer, 1982, Madagascar; *M. microamphopus* (Stebbing, 1910), Australia; *M. occidentalis* J. L. Barnard, 1959, California; *M. perdentatus* Chevreux, 1925, Senegal; *M. tequestae* new species, herein, Looe Key, Florida; *M. vesentiniiae* Ruffo, 1969, Red Sea; *H. incerta* Walker, 1904, Ceylon (Ledoyer, 1973; 1982) (= *Tulearogammarus peresi* Ledoyer, Madagascar, 1967), also reported by: Pillai, 1957, Travancore; Ruffo, 1969, Red Sea; Olerod, 1970, Philippines. *H. whakatane* J. L. Barnard, 1972, New Zealand

Legend for Figures

Capital letters in illustrations are explained in the following list; lower case letters to right of capital letters or in the body of an illustration are explained also in the following list; lower case letters to the left of capital letters are provided for subsidiary figures to note illustrated specimens listed in "Material." For each page of figures one main specimen is called "unattributed" and lacks letter designation.

A, antenna; B, body; C, coxa; D, dactyl; G, gnathopod; H, head; I, inner plate or ramus; J, prebuccal from lateral; L, labium; M, mandible; O, outer plate or ramus; P, pereopod; Q, pleopod; R, uropod; S, maxilliped; T, telson; U, labrum; V, palp; W, pleon; X, maxilla; Y, oostegite; l, left; r, right; s, setae removed.

*Hornellia (Metaceradocus)**tequestae* new species

Figures 1-3

Diagnosis.—Rostrum short. Eyes large. Anteroventral tooth of head sharp and of medium size. Article 1 of antenna 1 with apical cusp vestigial, apicoventral armament formed of one spine pair but not stout; accessory flagellum 5-articulate. Mandibular palp article 3 not falcate. Inner plate of maxilla 2 with strong facial row of setae. Coxa 1 anteroventral cusp and well setose below. Locking spines of pereopods 3-4 extending equally; dactyls of pereopods 3-7 with very weak armaments. Article 2 of pereopods 5-7 very narrow. Epimera 2-3 not serrate behind and with large posteroventral tooth. Peduncle of uropod 1 lacking basofacial armament. Peduncle of uropod 3 elongate, thus as long as peduncle of uropod 1; outer ramus of uropod 3 lacking article 2. Telson cleft about two-thirds its length, each apex broadly cleft, with about 3 spines each, no spines clearly medial more proximal than Mark 80.

Description of Holotype Male "y" 2.28 mm.—Eyes large, reniform or flask shaped and clear in alcohol, ommatidia numerous and densely packed. Antennae elongate, article 1 of antenna 1 with 2 spines and setae apicoventrally; gland cone large. Prebuccal mass, produced into anterodorsal boss, upper lip rigidly attached, subtruncate and deeply notched below. Incisors and laciniae mobiles toothed, rakers 6 or 7, molars heavily triturative, with accessory flake; palp article 1 elongate, articles 2-3 subequally long, setae = 2B,7D,4E. Each main lobe of labium with numerous cones, mandibular lobes sharp. Inner plate of maxilla 1 leaf-like, with small apical cusp and seta, and 8 long medial setae, outer plate on both sides with 12 apical spines, palps symmetrical, with 6 apical spines and 3 subapical setal-spines. Inner plate of maxilla 2 much broader than outer. Inner plate of maxilliped with one ventroapical coupling hook, 3 large apical spines and several setae; outer plate with only 3 leaf-like medial spines and 3 thinner apical spines; palp slender, dactyl unguiform, with short nail and several accessory setae.

Coxae 1-2 each with anteroventral cusp; as attached to body, coxae 3-4 appearing superficially to have anteroventral sharp corner but when pressed flat these coxae much longer and more rounded anteroventrally, also when attached to body coxae 3-4 bowed out strongly and appearing shorter than in reality. Coxa 5 almost as long as coxae 1-2 (and 3-4 when flattened), coxae 6-7 tilted and appearing shorter than in reality.

Gnathopod 1 of melitid form, wrist with weak broad bulbous lobe behind, palm oblique. Gnathopod 2 enlarged, wrist long and weakly lobate, hand very elongate, almond-shaped, palm occupying almost three-fourths of hand length, oblique, sparsely armed with spines, dactyl long, thin, curved, lined sparsely with inner short setae.

Pereopods 3-4 slender but shorter than pereopod 5, so flexible as to be turnable

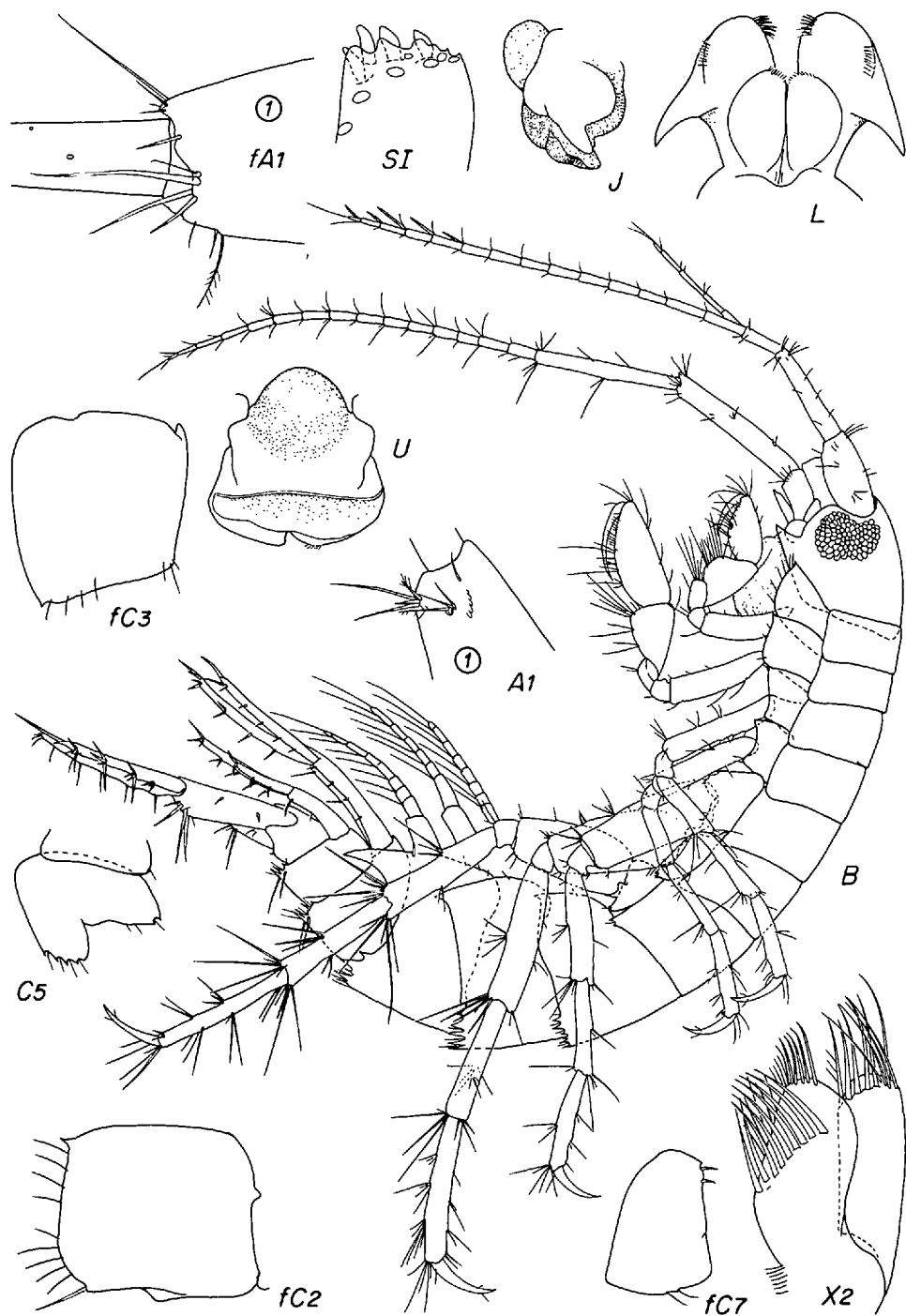


Figure 1. *Metaceradocus tequestae* new species, unattributed figures = holotype, male "y"; f = female "f".

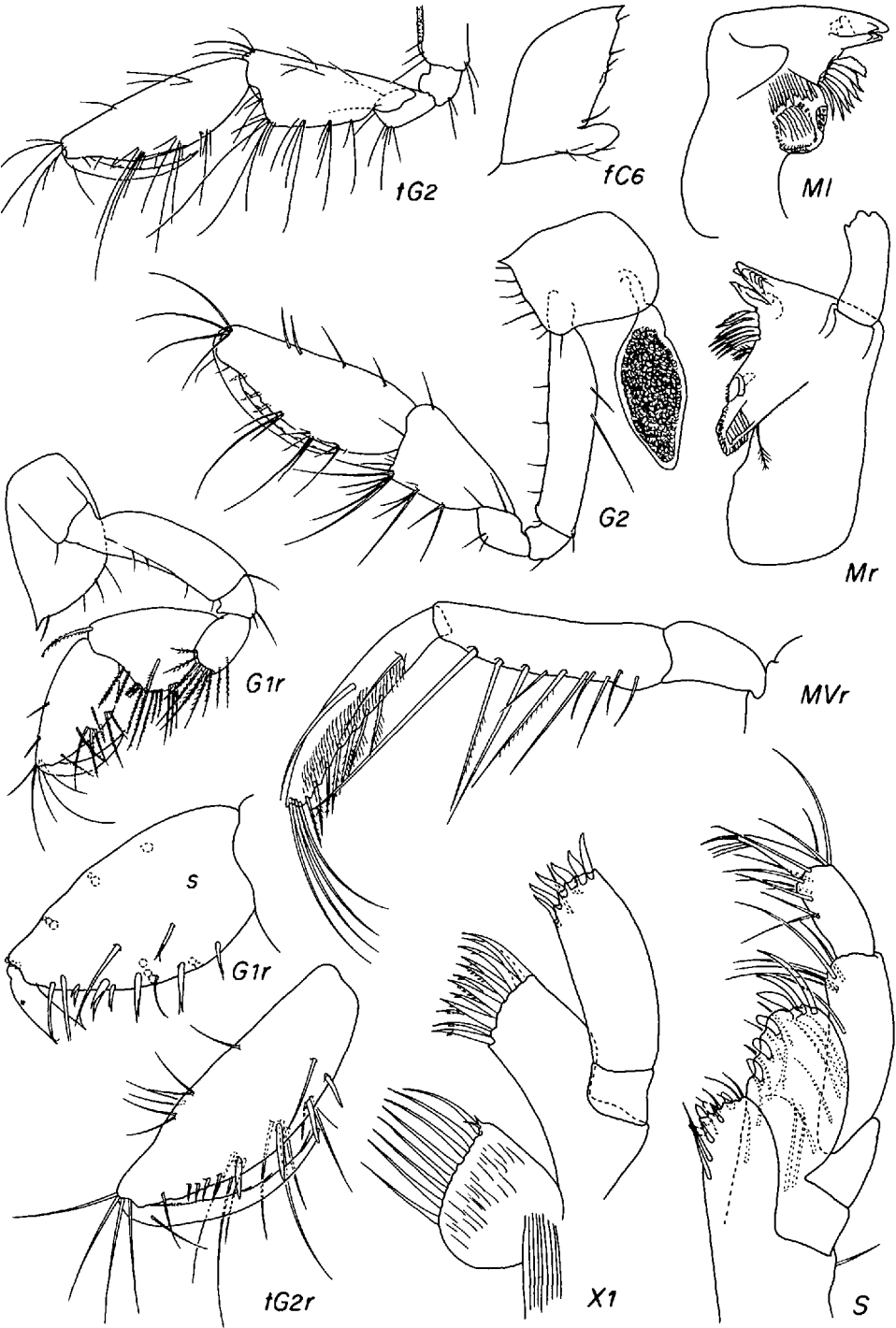


Figure 2. *Metaceradocus tequestae* new species, unattributed figures = holotype, male "y"; f = female "f"; t = female "t".

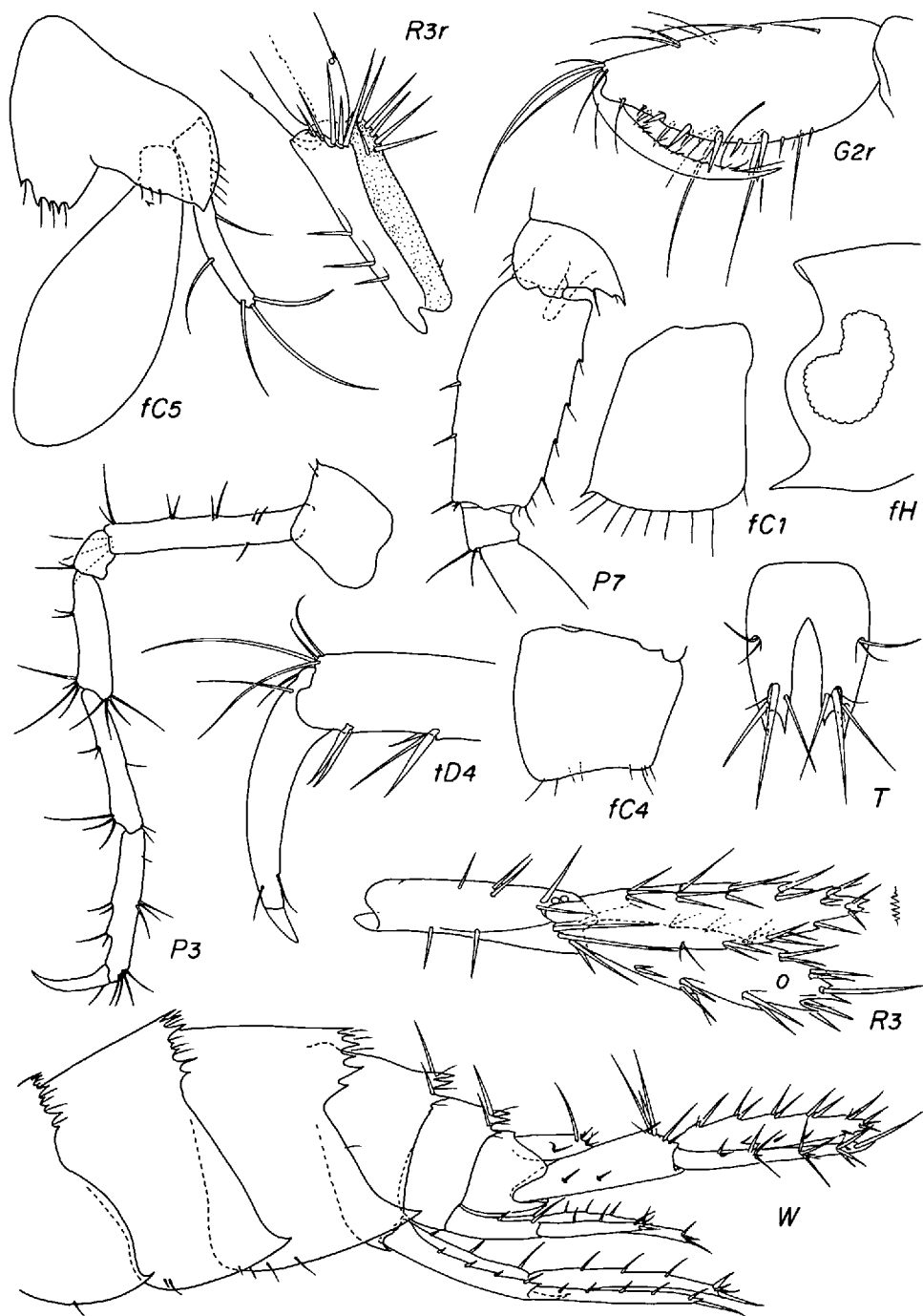


Figure 3. *Metaceradocus tequestae* new species, unattributed figures = holotype, male "y"; f = female "f".

both to front and rear, article 2 very slender. Pereopods 5–7 slender, in life probably extended dorsally as in melphidippids and megaluropids to facilitate walking or sitting upside down, article 2 unlobate, weakly serrate behind. Gills on coxae 2–6, gill 6 not reduced.

Pleopods (see female “f” below). Pleonites 1–5 dorsally serrate, pleonites 4–5 also with 4 long dorsal spines, pleonite 6 plain. Epimera not serrate behind, each with small to medium sharp posteroventral tooth, ventral spines on epimera 1–3 = 1-2-4. Peduncle of uropod 1 with ventral interramal tooth, no ventrolateral spine, with 4 small dorsolateral and 3 large dorsomedial spines, outer ramus slightly shortened, both strongly spinose; peduncle of uropod 2 with 2 dorsolateral and one dorsomedial spines, outer ramus strongly shortened, both strongly spinose. Peduncle of uropod 3 elongate, with pair of basal spines and 2 apical fans of spines, rami extending equally, 1-articulate, very spinose, apex of outer ramus with strong spine on basal bulb. Telson cleft about two-thirds, each apex strongly bifid, with 3 deeply subapical spines, middlemost thickest, medialmost at Mark 80, with pair of triad penicillate setules midlaterally (with third setule forming aberrant spinule in holotype).

Female “t” 2.76 mm.—Like male but with much thinner gnathopod 2 and with slender oostegites with following setal formula: distal setae = 2-2-2-2, anterior setae = 2-2-3-2, posterior setae = 4-3-1-0, anterior setules = 2-2-0-0, posterior setules = 0-1-2-5.

Female “f” 2.72 mm.—Illustrations of medial apex of article 1 on antenna 1, coxae 1–7, enlarged head anterior margin, one oostegite and gill provided; gills on coxae 2–6, gill of 6 not reduced; ventral spine formula of epimera 1–3 = 1-2-5.

Pleopods with elongate peduncle, rami slightly longer than peduncle, inner ramus slightly shortened, peduncle of uropod 1 with 4 lateral setae in tandem, absent on pleopod 2, pleopod 3 with one lateral spine, 2 medial groups of 3 spines each; coupling hooks 2, no accessories; outer rami articles = 9-8-7, inner = 7-7-6.

Male “z.”—Spine formula on epimera 1–3 = 0-contiguous pair-3.

Variations.—The heavy spination of the uropods and telson is beset with much variation in bilateral symmetry and from specimen to specimen.

Holotype.—USNM No. 195139, male “y” 2.28 mm, illustrated.

Type-locality.—Florida Keys, Looe Key Reef, 24°32'31"N; 81°24'12"W; station LKFR 1-C, coll. J. D. Thomas, 18 April 1982, formalin wash of algal turf on dead *Acropora cervicornis*, 7 m.

Distinctions.—This species differs from *H. (Metaceradocus) occidentalis* from California, and *H. (Metaceradocus) atlanticus*, new species herein, in the following characters: (1) strong head tooth; (2) anteroventral tooth of coxae 1–2; (3) article 5 of gnathopod 2 in female less elongate, dactyl not serrate; (4) serrate coxae 5–7; (5) larger and fewer spines on the palm of male gnathopod 2; (6) thinner articles 2–4 of pereopods 3–4, with longer article 5 and longer dactyls; (7) thinner article 2 of pereopod 7; (8) lack of spines on pleonite 6; (9) lack of basofacial spines on uropod 1; (10) relatively longer peduncle of uropod 3, with extra apical fan of spines, rami more inflated in middle, plumose setae absent; (11) less deeply cleft telson with deeper apical cleft on each telsonic lobe and bearing fewer basolateral spines.

This species also differs from *M. atlanticus* which has large inner armament of

the pereopodal dactyls, shorter more unequal locking spines, more expanded article 2 of pereopods 5–7, and more oblique apical notches on the telsonic lobes.

Remarks.—We suspect that this species walks and sits upside down much as do melphidippids and megaluropids.

Material.—Type-locality, male “z” 1.87 mm, female “t” 2.76 mm (illustrated), specimen “f” 2.72 mm, juvenile “j” 1.72 mm.

Distribution.—Florida Keys, 3–45 m.

Metaceradocus atlanticus new species

Figures 4–6

Diagnosis.—Rostrum short. Eyes large. Anteroventral tooth of head sharp and small. Article 1 of antenna 1 with apical cusp well developed, apicoventral armament formed of one stout spine; accessory flagellum 3-articulate; primary flagellum (not illustrated) with 14 articles, one aesthetasc each on articles 5–12; flagellum of antenna 2 with 12 articles. Mandibular palp article 3 scarcely falcate. Inner plate of maxilla 2 with strong facial row of setae. Coxa 1 with posteroventral cusp, well setose below. Locking spines of pereopods 3–4 extending unequally; dactyls of pereopods 3–7 with strong armaments. Article 2 of pereopods 5–7 of medium width. Epimera 2–3 not serrate behind, with large posteroventral tooth. Peduncle of uropod 1 bearing basofacial armament. Peduncle of uropod 3 weakly elongate, thus much shorter than peduncle of uropod 1; outer ramus of uropod 3 lacking article 2. Telson cleft fully, each apex broadly but asymmetrically and shallowly cleft, with 2 spines each, some spines clearly medial about Mark 50.

Description of Holotype Female “v” 2.91 mm.—Eyes large, reniform or flask-shaped and clear in alcohol, ommatidia numerous and densely packed. Antennae elongate, article 1 of antenna 1 with 1 spine and several setae apicoventrally; gland cone large. Prebuccal mass produced into anterodorsal boss, upper lip rigidly attached, subtruncate and deeply notched below. Incisors and laciniae mobiles toothed, rakers 7 or 8, molars heavily trititative, with seta; palp article 1 elongate, articles 2–3 subequally long, setae = 3A, 7D, 3E. Each main lobe of labium with numerous cones, mandibular lobes acutely rounded. Inner plate of maxilla 1 leaf-like, with small apical cusp, 2 setae and 10 long medial setae, outer plate on both sides with 11 spines, palps symmetrical, with 6 apical spines and 3 subapical setal-spines. Inner plate of maxilliped with one ventroapical coupling hook, 3 large apical spines and several setae; outer plate with only 4 leaflike medial spines and 4 thinner apical spines; palp slender, dactyl unguiform, with short nail and one accessory seta.

Coxae 1–2 each with posteroventral cusp; as attached to body, coxae 3–4 appearing superficially to have anteroventral sharp corner but when pressed flat these coxae much longer and more rounded anteroventrally, also when attached to body coxae 3–4 bowed out strongly and appearing shorter than in reality (but less so than in *M. tequestae*). Coxa 5 almost as long as coxae 1–2 (and 3–4 when flattened), coxae 6–7 tilted and appearing shorter than in reality.

Gnathopod 1 of melitid form, wrist with weak broad bulbous lobe behind, palm oblique. Gnathopod 2 weakly enlarged, wrist long and weakly lobate, hand more elongate than on gnathopod 1, almond-shaped, palm oblique, merging with posterior margin of hand, armed with spines and setal groups, dactyl short, thin, curved, serrate as on gnathopod 1.

Pereopods 3–4 slender but shorter than pereopod 5, so flexible as to be turnable



Figure 4. *Metaceradocus atlanticus* new species, unattributed figures = holotype, female "v"; u = female "u".

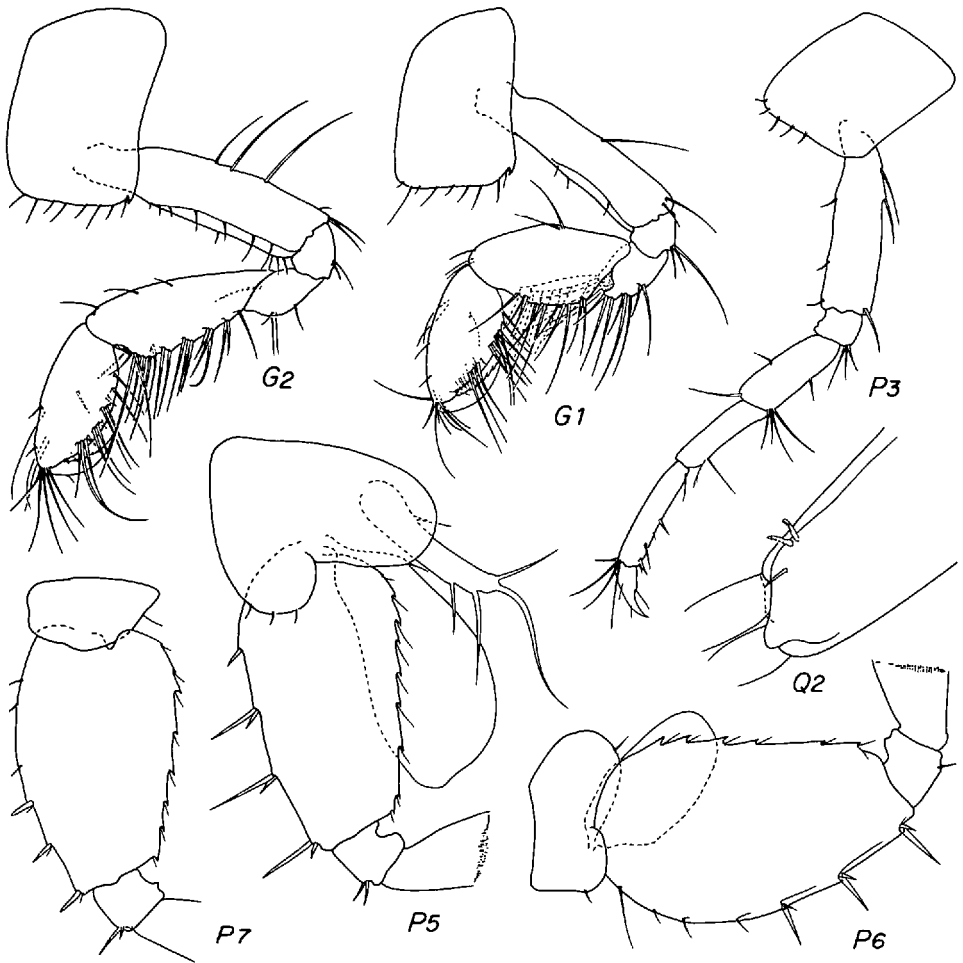


Figure 5. *Metaceradocus atlanticus* new species, unattributed figures = holotype, female "v".

both to front and rear overhead, article 2 very thin, article 4 stouter and article 5 longer than on *M. trequestae*, dactyls much shorter and stouter and with strong inner seta besides weak facial setule at base of nail. Pereopods 5-7 slender, in life probably extended overhead as in melphidippids and megaluropids to facilitate walking or sitting upside down, article 2 unlobate, weakly serrate behind, broader than in *M. tequestae*. Gills on coxae 5-6, gill 6 not reduced. Strap-shaped oostegites present on coxae 2-5, small and weakly setose.

Pleopods 1-3 with elongate peduncle bearing 2 coupling hooks, pleopods 1-2 with one simple accessory spine, only pleopod 3 spinose, rami extending subequally, slightly shorter than peduncle, inner ramus of pleopod 3 slightly shortened, outer rami with 7-6-6 articles, inner rami with 6-5-4 articles. Pleonites 1-5 dorsally serrate, 6 with 2 weak apicolateral serrations, pleonites 4-5 also with 2 long dorsal spines, pleonite 6 with 3-4 spines in 2 sets. Epimera not serrate behind, each with small to medium sharp posteroventral tooth, ventral spines on epimera 1-3 = 0-2-3. Peduncle of uropod 1 with ventral interramal tooth, pair of baso-

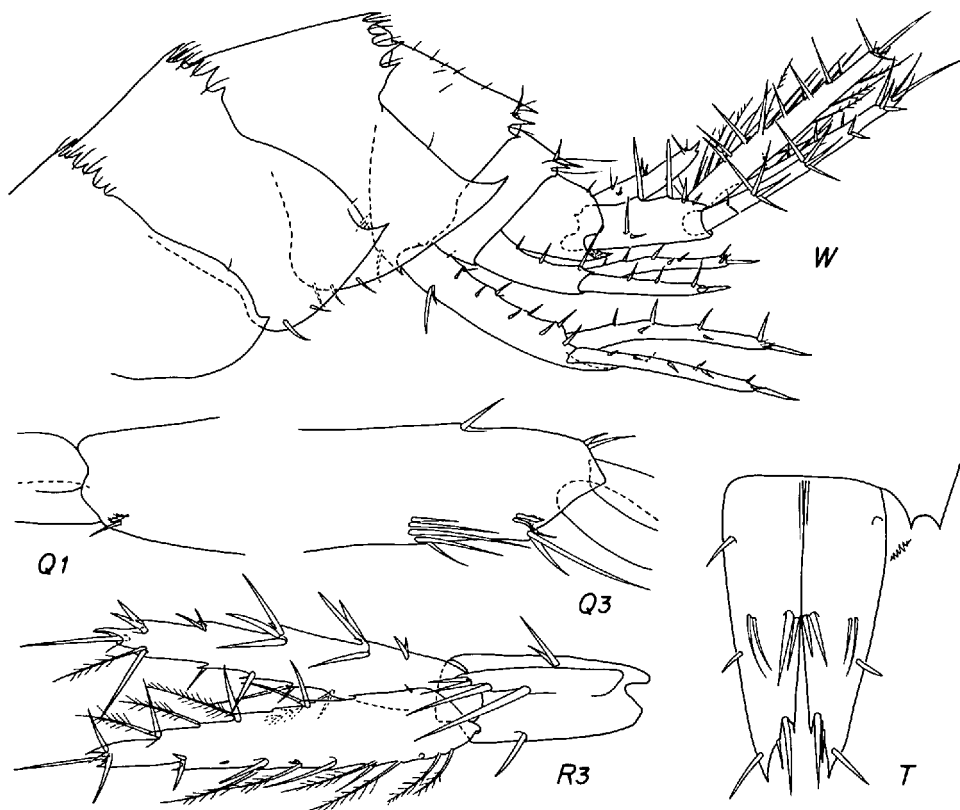


Figure 6. *Metaceradocus atlanticus* new species, unattributed figures = holotype, female "v".

lateral spines, with 5 small dorsolateral and 5 small dorsomedial spines, outer ramus not shortened, both strongly spinose; peduncle of uropod 2 with 3 dorsolateral and 2 dorsomedial spines, outer ramus slightly shortened, both strongly spinose. Peduncle of uropod 3 slightly elongate, with pair of basal spines and 1 apical fan of spines, rami extending equally, 1-articulate, very spinose, apex of outer ramus with strong spine on basal bulb. Telson elongate, cleft fully, each apex shallowly bifid, with 2 subapical spines, pair of medial spines at Mark 50, with pair of penicillate setules midlaterally, one spine each laterally at M. 20 and 60.

Holotype.—USNM No. 195140, female "v" 2.91 mm, illustrated.

Type-locality.—Belize, Carrie Bow Cay, 16°48'N, 88°05'W; station JDT Bel 87, coll. J. D. Thomas, 28 June 1982, formalin wash of rubble on IMSWE transect line in back reef, 1.8 m.

Material.—Type-locality, female "u" 3.28 mm (illustrated). JDT Bel 9, 10 June 1979, mix corallgal sediments from large sand trough in front of Carrie Bow Cay, 32 m, young male "s" 1.98 mm; JDT Bel 53, 11 June 1980, corallgal sediments, 34 m, 4 females.

Distinction.—This species differs from *Metaceradocus occidentalis* from the eastern Pacific Ocean in the strong tooth on epimera 2–3. This size relationship can be quantified as follows; the strong tooth of epimera 2–3 in *M. atlanticus* is as

large as the interramal cusp on uropod 1; the weak tooth of *M. occidentalis* is shorter than the dorsally articulated spines on the urosome.

Distribution.—Belize, 2–32 m.

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LITERATURE CITED

- Barnard, J. L. 1959. Ecology of Amphipoda and Polychaeta of Newport Bay, California. Estuarine Amphipoda. Allan Hancock Found. Publ. Occ. Pap. 21: 13–69.
- . 1972. The marine fauna of New Zealand: algae-living littoral Gammaridea (Crustacea: Amphipoda). New Zealand Oceanog. Inst. Mem. 62: 7–216.
- Chevreaux, E. 1925. Amphipodes I.—Gammariens. Voyage de la goelette *Melita* aux Canaries et au Senegal (1889–1890). Bull. Soc. Zool. Fr. 50: 278–311.
- Ledoyer, M. 1967. Amphipodes Gammariens des herbiers de phanerogames marines de la region de Tulear (Republique Malgache) etude systematique et ecologique. Ann. Fac. Sci. Univ. Madagascar 5: 121–170.
- . 1973. Amphipodes gammariens de la frondaison des herbiers d'*Enhalus* de la region de Nosy-Be (Madagascar) (Systematique et ecologie) comparaison avec la faune des herbiers de Tulear (*Cymodocea*, *Thalassia* etc. . .). Tethys Suppl. 5: 25–36.
- . 1982. Crustaces Amphipodes Gammariens Familles des Acanthonotozomatidae a Gammaridae. Faun. Madagascar 59: 1–598.
- Ruffo, S. 1969. Terzo Contributo alla Conoscenza Degli Anfipodi del Mar Rosso. Mem. Mus. Civ. Storia Nat. Verona 17: 1–77.
- Stebbing, T. R. R. 1910. Crustacea. Part 5. Amphipoda. Scientific Results of the Trawling Expedition H.M.C.S. "Thetis." Aust. Mus. Mem. 4 2: 565–658.
- Walker, A. O. 1904. Report on the Amphipoda collected by Professor Herdman, at Ceylon, in 1902. Report to the Gov. Ceylon Pearl Oyster Fish. Gulf of Manaar. Suppl. Rep. 17: 229–300.

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ADDRESSES: (J.D.T.) Newfound Harbor Marine Institute, Rt. 3, Box 170, Big Pine Key, Florida 33043; (J.L.B.) Department of Invertebrate Zoology, NHB 163, Smithsonian Institution, Washington, D.C. 20560.